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Mapping of the Scientific Production on the ITIL Application Published in the National and International Literature

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Abstract

Studies on ITIL (*Information Technology Infrastructure Library*) are distributed in a dispersed way in the literature, making it difficult to get a general overview on the subject. This article aims to establish a mapping of the scientific literature on the implementation of ITIL, published in major specialized journals and disseminated in the national and international literature. The resulted search, using the Scopus base with the ITIL keyword and limited to articles published in the last five years, produced 101 articles. After applying the *webibliomining* method, thirteen articles were selected using the class A items according to the ABC rating, in addition to two articles selected from the JISTEM Journal and one article from the Production Management Journal. It is clear that ITIL is considered to be the market's most popular model and contributes to improve organizational processes, bringing better results and quality to organizations.

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Keywords: Governance; ITIL; Technology.

1. Introduction

In its study, the Brazilian Software Association - ABES (*Associação Brasileira das Empresas de Software*) [1], stated that the growth of IT investments in Brazil in 2013 was representative, with an increase of 15.4% in relation to 2012, which is more than in the economies of other countries of the world, which averaged a growth of 4.8%. With this result, Brazil was among the ten fastest growers in the industry, coming in 7th place in the world ranking of IT investments.

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According to Rodrigues *et al*. [2], the executives of the surveyed companies adopt a management practice model to manage their demand processes, operations and assets, and ITIL (*Information Technology Infrastructure Library*) is the most frequently adopted model (almost 50%) among IT executives.

Although executives employ these process management models (ITIL, COBIT - *Control Objectives for Information and Related Technology*, etc.), ensuring standards, documentation and the monitoring and measurement of quality indicators, they are still removed from best practices because they do not have the performance indicators to add value to their business [2]. In this context, the following questions arise: Which company segments and countries adopt the ITIL practice? Which criteria are most used?

This paper seeks to present a compilation of information on ITIL found in the literature, providing different types of comparative analyses and applications of this methodology, as shown in item 5. In section 2, the ITIL concept used in this paper is described. Section 3 describes the applied research method in this review; section 4 demonstrates the application of the *webibliomining* model*;* section 5 presents the obtained results in the literature review; and section 6 closes with a conclusion.

2. ITIL Model

Companies are demanding a better and more disciplined delivery of IT services to ensure the perfect organizational functioning. In such way, IT departments/functions have been called upon to respond quickly to new business opportunities, to demonstrate sound financial management, and to satisfy internal staff and external customers. Such service levels can be achieved through an effective relationship and communication between the IT and business structures. In response to these demands of the business, IT organizations are adopting initiatives to improve their services, such as the *IT Infrastructure Library (ITIL* ®), Marrone *et al*. [3].

Gomes and Ribeiro [4] present ITIL as Information Technology Services Management (ITSM), based on a collection of best practices for the management of IT services. It was developed in England by the Central Computer and Telecommunication Agency (CCTA), a body of the British government. The main objective of ITIL is to align IT management with the needs of the business, maintaining the focus on the quality of services and ensuring the established service levels.

The adoption of the ITIL model brings some advantages to organizations, such as better quality of service, greater availability and stability of ICT services, a clear view of the capacities of the areas related to ICT service provision, and improved customer satisfaction, among other benefits [4].

3. *Webibliomining* Model

The purpose of the *Webibliomining* model proposed by Costa [5] is to provide an initial mapping of articles for a review of the literature. The model consists of the following steps:

- Definition of the research sample;
- Search of the sample with the keywords;
- Identification of the journals with the highest number of articles published on the subject;
- Identification of the authors with the highest number of publications;
- Survey of the chronology of production, and;
- Selection of articles to make up the "start-up core" for the literature review.

Some of these steps were used and adapted to define an initial core of articles for research related to the application of ITIL in both Brazilian and foreign companies, as presented in the following section.

4. Application of the Adapted Model Proposed by Costa [5]

In this section, an adaptation of the model proposed by Costa [5] will be applied. An exploratory research is used when there is a need to define the problem more clearly and to identify relevant courses of action before you can really develop an approach. Descriptive research, on the other hand, is aimed at describing something, usually its characteristics or functions, according to Malhotra [6].

4.1. Definition of the Research Sample

The sample corresponds to articles indexed in the Scopus Database. The choice of this database was given by its accessibility, because the inclusion criteria for the works in the collection are representative. A search was also performed in the Jistem journal, which made two articles addressing ITIL available. One article was selected from the Journal *Gestão e Producão*.

As for the cut-off time, the survey was conducted between October and November 2014, contemplating the last five years of publications, given that the issue under study is related to information technology.

Initially, "ITIL" was defined as keyword for the search, which returned 706 documents as results. Complementing the initial search and in order to filter the documents, a new search with the keyword "ITIL", with the limitations "articles" in journals and "last five years" returned 101 articles.

A list was created with 308 *keywords* and based on this a word cloud was generated. The most frequent occurrences found were: ITIL, COBIT, Management, Service, Information, Technology.

A list with the 101 abstracts was generated and this resulted in a word cloud that included a large quantity of the words ITIL, Management, Service, Process, and Information.

4.2. Identification of Journals

The 101 selected articles of the study are distributed over 77 different journals.

Table 1 - List of publications resulting from the research (Source: Portal Capes and Scopus).

Journals	QTD	Journals	QTD
Cutter IT Journal	6	Information Technology and Management	1
Intelligent Systems Reference Library	5	Information and Management	1
Information Systems Management	4	Acta Ethnographica Hungarica	1
Journal of Computer Science	3	Advances in Information Sciences and Service Sciences	1
Journal of Theoretical and Applied Information Technology	3	International Journal of Business Process Integration and Management	1
IEEE Transactions on Network and Service Management	2	International Journal of Digital Content Technology and its Applications	1
Communications of the Association for Information Systems	2	American Journal of Applied Sciences	1
Intelligent Decision Technologies	2	International Journal of Information Management	1
International Journal of Human Capital and Information Technology Professionals	2	International Journal of Information Security and Privacy	1
Journal of Enterprise Information Management	2	International Journal of Information Technology and Management	1
Journal of Power Sources	2	International Journal of Software Engineering and its Applications	1
Lecture Notes in Computer Science	2	Jiaotong Yunshu Xitong Gongcheng Yu Xinxi	1
Quality - Access to Success	2	Asian Journal of Information Technology	1

Journals	QTD	Journals	QTD
Chemistry Letters	1	Journal of Convergence Information	1
Communications in Computer and Information Science	1	Australasian Journal of Information Systems	1
Computer Networks	1	Journal of Information Technology	1
Computer Standards and Interfaces	1	Journal of Networks	1
Computers in Human Behaviour	1	BMC Medical Informatics and Decision Making	1
Cross Talk	1	Journal of Software Maintenance and Evolution	1
Cybernetics and Systems	1	Bell Labs Technical Journal	1
Cybernetics and Systems Analysis	1	Journal of Universal Computer Science	1
Decision Support Systems	1	Knowledge-Based Systems	1
DYNA	1	Business Process Management Journal	1
Dyna (Spain)	1	NEC Technical Journal	1
E-Informatica Software Engineering Journal	1	PLoS One	1
EkonomskaIstrazivanja	1	Profesional de la Información	1
Electrophoresis	1	Project Management Journal	1
Espacios	1	Business and Information Systems Engineering	1
Frontiers in Artificial Intelligence and Applications	1	Research Journal of Applied Sciences, Engineering and Technology	1
Fujitsu Scientific and Technical Journal	1	Revista Brasileira de Gestão e Desenvolvimento Regional	1
Gestão e Produção	1	Revista de Obras Públicas	1
Graziadio Business Report	1	Service Industries Journal	1
HP Laboratories Technical Report	1	Studies in Computational Intelligence	1
IEEE Transactions on Systems, Man and Cybernetics Part C: Applications and Reviews	1	Systems Science	1
IT Professional	1	Telecommunication Systems	1
Indian Journal of Science and Technology	1	Tobacco Science and Technology	1
Industrial Engineer	1	Total Quality Management and Business Excellence	1
Informatik-Spektrum	1	WSEAS Transactions on Systems	1
Information Systems and e-Business Management	1		

Considering the number of papers listed in Table 1, it was possible to identify the journals that deserve greater attention using a PARETO-type classification. These papers could be sorted and grouped as shown in Table 2, below:

Table 2: Journals of classification A according to the adapted *webibliomining* method

Journals Class A	
• Cutter IT Journal	• International Journal of Human Capital and Information Technology Professionals
• Intelligent Systems Reference Library	• Journal of Enterprise Information Management
• Information Systems Management	• Journal of Power Sources
• Journal of Computer Science	• Lecture Notes in Computer Science
• Journal of Theoretical and Applied Information Technology	• Quality - Access to Success

Journals Class A	
• IEEE Transactions on Network and Service Management	• Chemistry Letters
• Communications of the Association for Information Systems	• Communications in Computer and Information Science
• Intelligent Decision Technologies	

The Pareto classification has its origins in the work of Italian sociologist Vilfredo Pareto (1848-1923). Pareto's ABC classification is widely employed in materials management, and it can be easily found in classic books and papers in this context [5].

4.3. Identification of the Authors

This work makes no distinction between authorship and co-authorship. As such, 158 authors were identified in the search. Figure 1 shows the authors under whose names the works were published, limited to those who have at least two articles indexed, totaling a list of 07 authors.

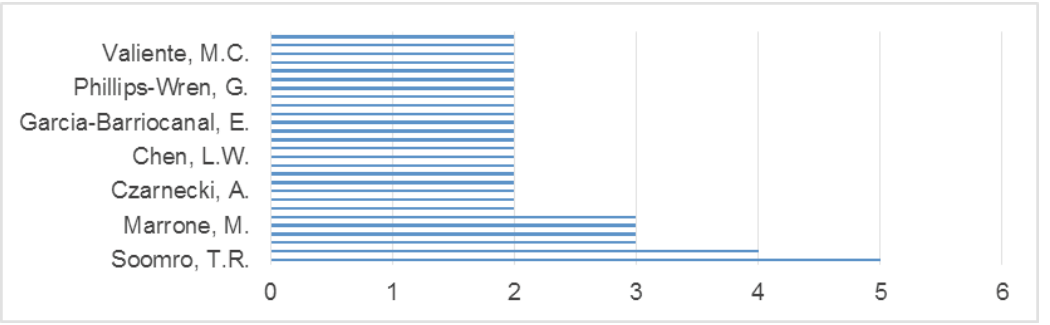

Fig. 1: Identification of the authors (Source: Portal Capes and Scopus).

4.4. Chronological Survey

In order to enable an observation of the evolution of the scientific production on ITIL, the quantitative data related to the distribution of records of published articles was grouped by year of publication, in the last five years, and consolidated in Figure 2.

Fig. 2: Distribution of articles published per year (Source: Portal Capes and Scopus).

5. Research Results

Table 3 presents the 16 articles, 13 of which were obtained from the Scopus data base, using the A classification presented in Table 2, in addition to the two articles selected from the Jistem journal and the one

selected from the journal *Gestão e Produção*. The purpose is to show the application of ITIL in Brazilian and foreign companies as well as the criteria and models used.

Table 3: Authors, selected articles for research and journals (Source: Developed by the authors).

Author(s)	List of selected papers for search	Journals
Ahmad, N. *et al.* (2014)	Technology adoption model and a road map to successful implementation of ITIL	Journal of Enterprise Information Management
Ali, S. M. *et al.* (2013)	Mapping information Technology infrastructure Library with other information Technology standards and best practices	Journal of Computer Science
Anica-Popa, I. (2012)	Standards in IT governance.	Quality - Access to Success
Bin-Abbas, H. and Bakry, S. H. (2014)	Assessment of IT governance in organizations: A simple integrated approach	Computers in Human Behavior
Erek, K. *et al.* (2014)	Managing Cloud Services with IT Service Management Practices	Intelligent Systems Reference Library
Gama, N. *et al*. (2011)	Using people-CMM for diminishing resistance to ITIL	International Journal of Human Capital and Information Technology Professionals
Iden, J. and Eikebrokk, T. R. (2014)	Using the ITIL Process Reference Model for Realizing IT Governance: An Empirical Investigation	Information Systems Management
Krisanthi, G. A. T. *et al.* (2014)	Governance audit of application procurement using COBIT framework	Journal of Theoretical and Applied Information Technology
Larrocha *et al.* (2011)	Proposals for postgraduate students to reinforce information security management inside ITIL	International Journal of Human Capital and Information Technology Professionals
Marrone, M. *et al.* (2014)	IT Service Management: A Cross-national Study of ITIL Adoption	Communications of the Association for Information Systems
Moreira, J. R. P. and Silva, P. C. (2013)	It Management Model for financial report issuance and regulatory and legal compliance	Journal of Information Systems and Technology Management
Nazımoğlu, O. and Özsen, Y. (2010)	Analysis of risk dynamics in information technology service delivery	Journal of Enterprise Information Management
Radecki, M. *et al*. (2012)	Towards professional service operations in Grids	Lecture Notes in Computer Science
Rodrigues, L. C. *et al.* (2009)	O desenho da gestão da tecnologia da informação nas 100 maiores empresas na visão dos executivos da TI	Journal of Information Systems and Technology Management
Sampaio, R. R. *et al.* (2012)	Mapeamento dos fluxos de informação e conhecimento: a governança de TI sob a ótica das redes sociais	Gestão da Produção
Valverde, R. *et al.* (2013)	ITIL-based IT service support process reengineering.	Intelligent Decision Technologies

Below, the results of this research are presented, with the contribution of each article.

In Ahmad *et al*. [7] the use of the UTAUT (Unified Theory of Acceptance and Usage of Technology) is proposed as an adoption model in IT governance structures. The study used a literature review to break down the critical success factors in the implementation of ITIL. The proposed model was then implemented by applying it to a case study of a company in the United Arab Emirates, where the ITIL implementation project failed. According to the authors, the ITIL model allows for flexibility of implementation in a wide variety of industries and businesses, but it also introduces many challenges, the most apparent or which is the mapping of ITIL processes for the world. As result, a roadmap for the successful implementation of ITIL is proposed. More studies are needed to understand the challenges and benefits of implementing ITIL from the perspective of the business. The article proposes an ITIL adoption model based on UTAUT, which is clearly absent in current literature. The study results refer to a proposal of a roadmap to implement ITIL.

According to Ali *et al*. [8], IT services have been acknowledged as critical strategic assets of the organization, and as such, organizations are investing a considerable amount of resources to support and deliver IT services. Several IT standards and practices are being implemented to support the business-oriented IT services of organizations. The study discusses the best practices in IT and maps the ITIL processes, showing the similarities between the different IT standards and the ITIL model, helping in the adoption of these standards in IT services.

For Anica-Popa [9], the development of Information and Communication Technologies (ICT) in the last two decades was crucial to ensure that ICT will be increasingly used in organizations. The standards and best practices adopted in recent years have as main objective the efficient use of IT resources. In the article, the three most widely employed IT governance standards are presented: COBIT, ITIL and ISO/IEC 20000/27000, and important issues are discussed that should be taken into account in the implementation process of IT governance standards.

Bin-Abbas and Bakry [10] sought to provide a unified and simple approach for the evaluation of IT governance. The approach is developed and tested through three main stages: (1) considering the main methods available, with emphasis on the basic requirements of IT governance; (2) designing the target approach that incorporates these requirements and uses knowledge management; and (3) illustrating the use of this approach by means of a typical illustrative application. The approach uses the "STOPE" (Strategy, Technology, Organization, People and Environment) outlook to integrate the issues involved, the knowledge management principles, as a value-added, and the phases of six sigma, as a cyclic improvement process. The study provides 50 main IT governance controls, and these enable the identification of the key strengths and weaknesses of IT governance in organizations. According to the authors, it should be noted that by considering knowledge and people management as the main fields of the integration outlook, the special emphasis on human factors in IT governance is illustrated.

The article developed by Erek *et al.* [11] addresses the fact that cloud computing represents a new trend in information technology (IT). In the same way, there is a growing need to align IT with the business strategy, in addition to seeking an increase in the transparency and the quality of IT processes and services. The authors claim that, for these reasons, ITIL has become a standard IT management. The objective of this article is to answer the question of how cloud computing can affect IT Service Management (ITSM) processes in general, and, in particular, how ITSM processes are used to ensure an efficient management in globally distributed services.

The main objective of the work by Gama *et al.* [12] is to test the hypothesis that the use of the best practices described in the framework *People Capability Maturity Model* (People-CMM) to improve the organizational maturity, can also have an impact on obtaining a better maturity in ITIL. This hypothesis was evaluated through three case studies, but more studies are needed to prove a cause-effect relationship between people, CMM and ITIL.

According to Iden and Eikebrokk [13], ITIL is a popular methodology for IT governance, but there is little academic research on ITIL. The authors investigate ITIL regarding the IT governance practices in order to illustrate the potential of this methodology as a stimulus to IT governance. A field study shows that the success of an IT implementation is particularly influenced by the effectiveness of the group and of organizational resources, and, to a lesser extent, by the involvement of senior managers. The results show, as expected, that ITIL is an adequate structure for IT governance, encouraging best practices for management processes.

Krisanthi *et al.* [14] present an audit of the information system to check the level of readiness of an organization in IT management. A measurement of the level of maturity of contracts in one of the universities in Indonesia is applied, using the COBIT 4.1 framework for various IT processes related with procurement applications, mapping the identification of business objectives, information technology targets and COBIT 4.1 information technology processes. The authors state in their study that the best practices are obtained using the ITIL V3 standard through the mapping of the IT processes of COBIT 4.1.

The article by Larrocha *et al.* [15] reviews and updates the various proposals made in a previous article drafted by the same authors, which was geared towards graduate students in the field of IT Service Management. The treatment given to Information Security Management in ITIL, in both versions 2 and 3, is analyzed. The various graduate programs on offer that work with these methodologies are discussed, in addition to the opinions and evaluations of students.

The study by Marrone *et al.* [16] aims to explore empirically how IT service management is adopted in today's global economy. The adoption of operational processes is compared with the adoption of processes on a tactical and strategic level. In addition, the size and industry of the organization adopting the ITIL processes is evaluated. An institutional theory is used as the basis for the study. The analysis is based on 623 responses to three questionnaires applied in the UK, USA, DACH (German-speaking countries) and Australia. The study found that organizations adopt ITIL most notably at the operational level, rather than for tactical / strategic processes. DACH countries show a greater adoption of ITIL than the United Kingdom, the USA and Australia. The adoption of ITIL also varied by industry and, in part, by size of the organization.

Moreira da Silva [17] present an Information Technology Management model consisting of the best management practices of COBIT, ITIL, and BPM (Business*Process Management*), along with SOA (*Service-Oriented Architecture)* and XBRL (*Extensible Business Reporting Language*) technologies. This model is composed of 03 layers that seek to structure the organization of IT and business processes, in addition to defining a process for the implementation of SOA and integration of its web services with the XBRL language. The authors expect that the paper will contribute so that companies can reduce the negative impact resulting from the lack of compliance with laws and regulations by creating an IT and corporate environment that is flexible and more adaptable to change, which can result from legal obligations, in addition to improving the quality and reliability in the generation of financial reports.

The article by Nazımoğlu and Özsen [18] proposes to define and analyze the risks of the Information Technology (IT) areas in the provision of services. The objective is to advance our understanding of risks and their effects on specific processes within the provision of IT services. Design/methodology/approach - Risks were determined through the review of procedures at *International Business Machines* (IBM), taking ITIL as a standard in IT, and with the aid of the metrics model for IT Service Management (ITSM). The ITSM metrics model is used to find the delay times for specific processes and to determine specific risks. As result, the authors pointed out that the "unhappy customer" risk has the greatest impact on all processes. The second risk with the greatest impact is the "delay in solutions", and the third is "low employee morale". The risks found in the article can be reduced by conducting more research. In further studies, hypotheses could be tested about the outcome of this study, so as to increase its sensitivity. The authors conclude that the risks in the delivery of IT services can be identified and, as such, that uncertainty can be reduced for those companies that outsource their IT departments.

For Radecki *et al.* [19], the management of large IT infrastructures requires a service operation infrastructure involving a daily maintenance. In this article, the authors describe the service operation model developed in the PL - Grid project and how this model was influenced by ITIL. They also discuss how to adapt the ITIL rules so as to geographically and administratively manage infrastructures that provide grid resources to the academic community. They conclude that the adaptation of a particular model for the management of services is a prerequisite for the design of an appropriate infrastructure that ensures user satisfaction.

In Rodrigues *et al*. [20], the objective of the article was to identify the IT management design of the 100 largest Brazilian companies. The study used a quantitative approach. The main results showed that: a) an alignment with the basic business processes was observed, but with evidence of dyssynchrony; b) the management was geared towards compliance systems (ITIL, COBIT), but there was no optimization of business processes; c) IT delivers the basic demands, but without the necessary structure for the imposition or use of automated best practices; and d) the quality of IT is based on documented processes, but does not present indicators for the control and guidance of business performance.

For Sampaio *et al.* [21] the main objective of the study was to contribute to an understanding of the dynamics associated with technological innovation and technical-scientific training processes based on a case study focused on the procedures and information flows generated by the Board of Training of a large Telecom in Brazil. The study was developed considering qualitative and quantitative approaches. According to the authors, the article was developed to describe and analyze the knowledge creation and dissemination processes in the organization, associated with the Social Network Analysis (SNA) techniques. The results of the study suggest that there is evidence of a scale free topology in the studied networks, making the information flows and know-how resistant to random "attacks" (for example; spontaneous exit of a team member), but vulnerable to planned "attacks" (for example; the removal of well connected individuals or hubs).

The study by Valverde *et al.* [22] proposes to provide a methodology on how to apply ITIL to evaluate the processes of IT support services, their re-engineering and alignment with best practices, and their subsequent integration into a decision support structure. A case study was used to identify a set of Key Performance Indicators (KPIs), which were monitored by a decision support system to trigger the redesign of the IT support service processes. The study focuses on the implementation of the ITIL guidelines at the operational level, the improvement of services, and on incident, problem, change, obligations release and configuration management. It also presents the implementation of ITL guidelines on the tactical level to improve service levels, capacity, service continuity, service availability and security management. The study concludes by providing recommendations for future research.

6. Concluding Remarks

In recent years, the technology industry has attracted the attention of researchers from various fields of knowledge, such as: Administration, Production Engineering (emphasis on Quality Management and Quality of Services) and Computer Sciences. The survey of the literature reveals that both companies based in Brazil and big global corporations, have a proximity to IT management models, in which IT is managed not as a system that generates innovations and disrupts business rules, but rather as a system to provide solutions.

The article met its stated objective of presenting a compilation of information on ITIL found in the literature, providing different types of comparative analyses and applications of this model, using an adaptation of the *webibliomining* method to this end, which generated a starting core for the realization of this research in the journals.

Through the literature review it became apparent that ITIL is presented as a management model based on best market practices, used by IT executives to manage their demand processes, being the most common IT management model.

One can also see that if the organization adopts the best practices of ITIL, then this means that it is concerned with continuous improvement, preparing itself to offer better services and care to its customers.

As suggestion for future work, a similar study could be conducted including other databases, such as Science Direct and ISI, to provide other criteria, another mapping, and to expand our knowledge about the application of ITIL.

One observed limitation of the study is that it wasn't possible to obtain a general classification in relation to other databases, since the application of the adapted *webibliomining* method considered only one database (Scopus) and the JISTEM journal.

References

[1] ABES. Associação Brasileira das Empresas de Software. 2014. Mercado Brasileiro de Software: Panorama e Tendências. São Paulo, Junho.

[2] Rodrigues L C, Maccari E A, Simões S A. O desenho da gestão da tecnologia da informação nas 100 maiores empresas na visão dos executivos de TI. *Journal of Information Systems and Technology Management* 2009;**6**(3):483-506

[3] Marrone M, Gacenga F, Cater-Steel A, Kolbe L. IT service management: a cross-national study of ITIL adoption. *Communications of the Association for Information Systems* 2014;**34**(1):865-892.

[4] Gomes C F S. *Gestão da cadeia de suprimentos integrada à tecnologia da informação*. Cengage Learning Editores; 2004.

[5] Costa H G. Modelo para webibliomining: proposta e caso de aplicação Model for webibliomining: proposal and application. *Revista FAE*, 3, 2010; 115-126.

[6] Malhotra N K. *Pesquisa de marketing: uma orientação aplicada*. Bookmam; 2006.

[7] Ahmad N, Tarek Amer N, Qutaifan F, Alhilali A. Technology adoption model and a road map to successful implementation of ITIL. *Journal of Enterprise Information Management* 2013;**26**(5):553-576.

[8] Ali S M, Soomro T R, Brohi M N. Mapping Information Technology Infrastructure Library with other Information Technology Standards and Best Practices. *Journal of Computer Science*, 2013;**9**(9):1190-1196.

[9] Anica-Popa, I. Standards in IT governance. *Quality - Access to Success* 2012;**13**(130):110-112.

[10] Bin-Abbas H, Bakry S H. Assessment of IT governance in organizations: A simple integrated approach. *Computers in Human Behavior* 2014;**32**:261-267.

[11] Erek K, Proehl T, Zarnekow R. *Managing Cloud Services with IT Service Management Practices*. Springer Berlin Heidelberg; 2014: 67-81.

[12] Gama N, da Silva R N, da Silva M M. Using people-CMM for diminishing resistance to ITIL. *International Journal of Human Capital and Information Technology Professionals* 2011;**2**(3):29-43.

[13] Iden J, Eikebrokk T R. Using the ITIL Process Reference Model for Realizing IT Governance: An Empirical Investigation. *Information Systems Management* 2014;**31**(1):37-58.

[14] Krisanthi G A T, Sukarsa I M, Bayupati P A. Governance audit of application procurement using COBIT framework. *Journal of Theoretical and Applied Information Technology* 2014;**59**(2):342-351.

[15] Larrocha E R, Minguet J M, Díaz G, Castro M, Vara A, Martín S, Cristobal E S. Proposals for postgraduate students to reinforce information security management inside ITIL®. *International Journal of Human Capital and Information Technology Professionals* 2011;**2**(2):16-25.

[16] Marrone M, Gacenga F, Cater-Steel A, Kolbe L. IT service management: A cross-national study of ITIL adoption. *Communications of the Association for Information Systems* 2014;**34**(1):865-892.

[17] Moreira J R P, Silva P C. It Management Model for financial report issuance and regulatory and legal compliance. *JISTEM Journal of Information Systems and Technology Management* 2013;**10**(3):597-620.

[18] Nazimoglu Ö, Özsen Y. Analysis of risk dynamics in information technology service delivery. *Journal of Enterprise Information Management* 2010;**23**(3):350-364.

[19] Radecki M, Szepieniec T, Szymocha T, Szopa M, Krakowian M. Towards professional service operations in Grids. *Building a National Distributed e-Infrastructure–PL-Grid*. Springer Berlin Heidelberg; 2012;27-39.

[20] Rodrigues L C, Maccari E A, Simões S A. O desenho da gestão da tecnologia da informação nas 100 maiores empresas na visão dos executivos de TI . *Journal of Information Systems and Technology Management* 2009;**6**(3):483-506.

[21] Sampaio R R, Rosa C P, Pereira H B B. Mapeamento dos fluxos de informação e conhecimento: a governança de TI sob a ótica das redes sociais. *Revista Gestão da Produção* 2012;**10**(2):377-387.

[22] Valverde R, Saade R G, Talla M. ITIL-based IT service support process reengineering. *Intelligent Decision Technologies* 2014;**8**(2):111-130.